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Initiation and progress of limb regeneration were altered in fifth periopod severed *P. indicus* exposed to different sublethal concentrations of Phosphamidon. Inhibition of limb regeneration was dose dependent. Phosphamidon caused inhibition in regeneration and delayed the initiation of limb bud development in lower concentration (0.01, 0.02, 0.05 and 0.1 ppm) but in higher concentrations (0.2 ppm) both the processes were inhibited. Results suggested that crustacean limb regeneration can be taken as a parameter for assessing toxic effects of environmental pollutants.

Pollution by pesticides is increasing due to indiscriminate and wide spread use. The organophosphorous (OP) insecticides, which replaced organochlorine insecticides in recent years, are rapidly biodegradable and seldom leave residues in the environment. The determination of acute toxicity levels has little relevance in the estimation of ecologic consequences. Crustacean limb regeneration has been considered to be a sensitive parameter for assessing the water quality of the aquatic environment. Hence the present investigation is made to understand the toxic impact of sublethal concentrations of phosphamidon on the limb regeneration of penaeid prawn, *Penaeus indicus*. The effects of phosphamidon, a broad spectrum OP insecticide used locally where *P. indicus* is one of the commercially important and cultivable species of fisheries, are therefore important in understanding the chemical pollution of coastal waters of Kavali.

*P. indicus* (75 ± 5 mm in length and 2.5 ± 0.5 g wt) were collected from the Buckingham canal and Thummalapenta seacoast near Kavali (14° 50' E and 80° 5' N) only the intermolt individuals were transferred to large aquaria and acclimated to laboratory conditions for 1 week in aerated seawater (salinity 15 ± 1 × 10⁻³, pH, 7.1 and temperature, 23 ± 2°C). The prawns were fed *ad libitum* with powdered oil cake. Seawater was changed daily to remove diffused food particles and excretory material. Technical grade phosphamidon (O. O-dimethyl-O-1-methyl-2-chloro-2-diethyl-carbomoyvinyl phosphate) of 92 % purity (Hindustan CIBA - GEIGY, Bombay) was the test chemical. This chemical had a LC₅₀ value (for 48 h) of 0.9 ppm in a static bioassay system. Prawns were divided into 6 groups of 50 each. The fifth left periopod was removed from each prawn.

One of the groups served as control while the others were exposed to phosphamidon concentrations of 0.01, 0.02, 0.05, 0.1, 0.2 ppm each, from the day of limb removal until the prawns completed at least 1 ecdysis or until the termination of experiment (30 d). The seawater media for control and experimental animals were replaced with fresh media daily. The prawns were examined at 2 d intervals under a microscope in order to assess the progress in limb regeneration and the advances in molt cycle. The regeneration index (R) was determined following the method of Bliss:

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R = \frac{\text{Length of limb bud}}{\text{Carapace length}} \times 100
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No mortalities were observed in both control and experimental groups. Successful completion of limb regeneration was noted only in animals subjected to limb removal during the intermolt (stage C of prawn) period in about 15 d after its limb removal. *P. indicus* exposed to phosphamidon did not alter the
relative duration of the intermolt cycle. The prawns in control regenerated the limb at a rapid rate (Fig. 1). However the limb regeneration was inhibited in a dose - dependent manner among the prawns exposed to different sublethal concentration of phosphamidon. The R values and concentration of phosphamidon showed an inverse relationship with reference to limb regeneration. At 0.2 ppm concentration phosphamidon caused complete inhibition of regeneration and also delayed the initiation of limb bud generation. Similar observations were made by Ranga Rao et al. in shrimps after exposing them to sublethal concentration of pentachlorophenol.

From the present results it can be concluded that, phosphamidon contamination causes delay in the onset of limb bud initiation and the inhibition of limb bud regeneration of prawns. The crustacean limb regeneration is a sensitive parameter in monitoring the toxic response of aquatic biota to different levels of chemical pollutants.

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References